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(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
29.11.2000 Bulletin 2000/48

(51) Int. Cl.⁷: **C08F 10/02**, C08F 4/625,
C08F 4/70, C07F 11/00,
C07F 7/00

(43) Date of publication A2:
14.06.2000 Bulletin 2000/24

(21) Application number: **99124058.1**

(22) Date of filing: **10.12.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **11.12.1998 JP 35354898**
01.07.1999 JP 18778199

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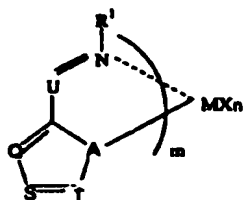
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(54) **Olefin polymerization catalyst and process for olefin polymerization**

(57) The present invention provides an olefin polymerization catalyst by the use of which an olefin (co)polymer can be obtained with a high polymerization activity, and also provides a process for olefin polymerization using the catalyst. The olefin polymerization catalyst comprises a transition metal compound (A) represented by the formula (I):



(I)

Q: R³-C, N, P
S: R⁴-C, N, P
T: R⁵-C, N, P
m: 2 - 6
R¹ - R⁵: hydrogen, hydrocarbon group, silicon-containing group or the like (When M is an atom of Group 6, R¹ is not an aromatic hydrocarbon group.)
n: number satisfying a valence of M
X: halogen, hydrocarbon group or the like

M: atom of Group 3 to Group 11
U: R²-C, N, P
A: N, P



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EUROPEAN SEARCH REPORT

Application Number
EP 99 12 4058

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20 September 2000	Examiner Parry, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)



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Application Number
EP 99 12 4058

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20 September 2000	Examiner Parry, J
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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Application Number
EP 99 12 4058

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20 September 2000	Examiner Parry, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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Application Number
EP 99 12 4058

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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<div> <div> <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone</p> <p>Y : particularly relevant if combined with another document of the same category</p> <p>A : technological background</p> <p>O : non-written disclosure</p> <p>P : intermediate document</p> </div> <div> <p>T : theory or principle underlying the invention</p> <p>E : earlier patent document, but published on, or after the filing date</p> <p>D : document cited in the application</p> <p>L : document cited for other reasons</p> <p>& : member of the same patent family, corresponding document</p> </div> </div>			

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EUROPEAN SEARCH REPORT

Application Number
EP 99 12 4058

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	<p>DATABASE CHEMABS 'Online! CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; GARNOVSKII, A. D. ET AL: "Complexes of metals with some nitrogen-containing ligands. XXIV. Complexes of transition metals with 2-(aryazo) derivatives of the imidazole series" retrieved from STN Database accession no. 76:41435 XP002146790 * abstract * & ZH. OBSHCH. KHIM. (1971), 41(8), 1829-36</p>	1	<p>TECHNICAL FIELDS SEARCHED (Int.Cl.7)</p>
X	<p>DATABASE CHEMABS 'Online! CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; UEDA, YUTAKA ET AL: "Optical recording medium" retrieved from STN Database accession no. 105:33031 XP002146791 * abstract * & JP 60 249143 A (RICOH CO., LTD., JAPAN) 9 December 1985 (1985-12-09)</p>	1	
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20 September 2000	Examiner Parry, J
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EUROPEAN SEARCH REPORT

Application Number
EP 99 12 4058

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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X	--- DATABASE CHEMABS 'Online! CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; HOLM, RICHARD H. ET AL: "synthesis, structures, and soln. equil. of bis(pyrrole-2- aldimino)metal(II) complexes" retrieved from STN Database accession no. 13729h XP002145249 * abstract * & HOLM, R. H.: "The synthesis, structures and solution equilibria of bis(pyrrole-2-aldimino)metal(II) complexes" INORG. CHEM., vol. 5, no. 4, 1966, pages 625-635,	1	
A	WO 97 48736 A (EXXON CHEMICAL PATENTS INC) 24 December 1997 (1997-12-24) * page 15, line 1 - page 16, line 20 *	1-4	
P,X	WO 99 19335 A (GIBSON VERNON CHARLES ;NEWTON CLAIRE (GB); BP CHEM INT LTD (GB); S) 22 April 1999 (1999-04-22) * page 30; claims 11,12; example 6.3 *	1-4	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20 September 2000	Examiner Parry, J
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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Application Number

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 99 12 4058

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 3 of the periodic table of elements wherein the ligands are not bonded to each other via R.

2. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 4 of the periodic table of elements wherein the ligands are not bonded to each other via R.

3. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 5 of the periodic table of elements wherein the ligands are not bonded to each other via R.

4. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 6 of the periodic table of elements wherein the ligands are not bonded to each other via R.

5. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 7 of the periodic table of elements wherein the ligands are not bonded to each other via R.

6. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 8 of the periodic table of elements wherein the ligands are not bonded to each other via R.

7. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 9 of the



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

periodic table of elements wherein the ligands are not bonded to each other via R.

8. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 10 of the periodic table of elements wherein the ligands are bonded to each other via R.

9. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 11 of the periodic table of elements wherein the ligands are bonded to each other via R.

10. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 3 of the periodic table of elements wherein the ligands are bonded to each other via R.

11. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 4 of the periodic table of elements wherein the ligands are bonded to each other via R.

12. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 5 of the periodic table of elements wherein the ligands are bonded to each other via R.

13. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 6 of the periodic table of elements wherein the ligands are bonded to each other via R.



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**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 99 12 4058

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

14. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 7 of the periodic table of elements wherein the ligands are bonded to each other via R.

15. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 8 of the periodic table of elements wherein the ligands are bonded to each other via R.

16. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 9 of the periodic table of elements wherein the ligands are bonded to each other via R.

17. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 10 of the periodic table of elements wherein the ligands are bonded to each other via R.

18. Claims: 1-4 (in part)

The subject matter of claims 1-4 insofar they relate to complexes comprising transition metals of group 11 of the periodic table of elements wherein the ligands are bonded to each other via R.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 12 4058

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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20-09-2000

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